

Claims

1. A method for positioning a gel in a gel holder comprising:
 - (a) separating a gel cutting (27) from the gel, said gel cutting having an edge contour which corresponds to the contour of the chamber (24) for receiving the gel cutting (27) in a gel holder (21),
 - (b) inserting the gel cutting (27) into said chamber (24) of said gel holder (21), and
 - (c) covering the gel cutting (27) with an equilibrating liquid (31).
2. The method according to claim 1, wherein the edge contour of the gel cutting (27) is smaller than the contour of the chamber (24) so that when the gel cutting (27) is inserted into the chamber (24) the gel cutting can move in the gel holder (21) by an extent which is smaller than a predetermined maximum permissible deviation between a picking position in the gel cutting (27) and the picking location in a picking device.
3. The method according to claim 1, wherein the edge contour of the gel cutting (27) is larger than the contour of the chamber (24) so that when the gel cutting (27) is inserted into the chamber (24) the gel cutting is immovably disposed therein.
4. The method according to claim 1, wherein the position of the gel cutting (27) is fixed with respect to the chamber (24) by a clamping means (25).
5. The method according to claim 1, wherein the gel cutting (27) is separated from the gel by means of a gel cutter (11), wherein the gel cutter (11) has a cutting edge (18) with a contour which approximately corresponds to the contour of the chamber (24) for receiving the gel cutting (27) in the gel holder (21).

6. The method as claimed in claim 5, comprising carrying out the cutting and thereby the separation of the gel cutting (27) from the gel by placing the gel cutter (11) onto the gel.

7. The method according to claim 1, wherein the gel is stored in the equilibrating liquid (31) before cutting said gel cutting (27).

8. The method according to claim 1, wherein said chamber (24) of said gel holder (21), which contains the gel cutting (27), receives at least an amount of equilibrating liquid (31) which is sufficient for forming a layer of equilibrating liquid over the gel cutting (27), said layer covering the entire surface of the gel cutting (27).

9. A gel holder for carrying out a method according to claim 1, which comprises a lower part (29) and a frame-like upper part (25), wherein the lower part has a chamber (24) that has a bottom surface and is formed to receive a plate-like gel cutting, and the upper part (25) has a clamping part (26) which, when the upper part (25) is placed on the lower part (29), protrudes into the chamber so that a peripheral portion of a gel cutting (27) located in the chamber (24) can be clamped in between the clamping part (26) and the bottom surface of the chamber (24).

10. A gel holder according to claim 9, wherein the lower part (29) has a bottom consisting of at least in part of a material that is transparent to radiation, in particular light, that can be used to detect concentration points in a gel cutting (27).

11. A gel holder according to claim 9, wherein the clamping part (26) is a strip that substantially complements the contour of the chamber (24) so that the clamping part (26) can be lowered into the chamber (24) by sliding against the

side walls, which define the chamber (24), or with a small amount of clearance, so that the clamping effect of the clamping part (26) is established in a line at the edge (28) of a gel cutting (27) disposed in the lower part (29).

12. A gel cutter for carrying out a method according to claim 1, which comprises a cutting edge (18), having a contour that corresponds to a predetermined contour of a gel cutting (27) to be cut, so that the gel cutting (27) can be cut out by the cutting edge being pushed through the gel, said gel cutting (27) having a thickness which is smaller than the perimeter of the gel cutting (27) and said perimeter is identical with or at least approximately equal to the perimeter of a chamber for receiving the gel cutting in a gel holder.

13. A gel cutter according to claim 12, wherein the cutting edge (18) is formed as a sharp edge of strip (16) or an edging consisting of at least two strip-like elements, which is or are attached in a close fitting manner to the outer surface of a raised portion (13), wherein the outer surface (14) of the raised portion defines the cutting line for the cutting edge (18).

14. A gel cutter according to claim 13, wherein the strip (16) or strip-like elements comprises of metal, ceramic, glass or plastic material.

15. A method for separating and removing gel pieces from a gel cutting (27) that which compound is located in a gel holder (21) together with an equilibrating liquid (31), which comprises

(a) locating a layer of equilibrating liquid (31) both above and below the gel cutting (27) at least in the region of the gel cutting where the pieces thereof are to be removed,

(b) pushing a tubular removal means (66) through the gel cutting (27) with the end of this tubular removal means (83) comprising an opening, and then by production of underpressure in the removal means (66) a picked-out gel piece (69)

and equilibrating liquid (31) that follows the end of the tubular removal means are drawn into the removal means (66) so that the gel piece (69) is separated from the opening at said end (83) of the removal means (66) by means of a column of the equilibrating liquid (31).

16. The method according to claim 15, which comprises maintaining a layer of the equilibrating liquid (31) above the gel cutting (27) so that when the removal means (66) penetrates the gel cutting (27), a short liquid column of the equilibrating liquid (31) is first received in the removal means (66) so that after separation of a gel piece (69), a layer of the equilibrating liquid (31) is also provided above the gel piece (69) in the removal means (66).

17. The method according to claim 15, which comprises inserting the gel holder (21) into a removal apparatus that comprises at least one removal device (51) having a removal means (66), and positioning the removal device (51) at the predetermined locations on the gel cutting (27) and removing the gel pieces (69) by means of the removal device (51) prior to separating the gel pieces (69).

18. The method according to claim 15, which comprises ejecting a separated gel piece (69) from the removal means (66) by production of overpressure in the removal means (66).

19. The method according to claim 15, wherein a gel holder (21) is used that has a lower part (29) and an upper part (25), wherein the lower part has a chamber (24) which has a bottom surface and is formed to receive a plate-like gel cutting (27), and the upper part (25) has a clamping part (26) which, when the upper part (25) is placed on the lower part (29), protrudes into the chamber so that a peripheral portion of a gel cutting (27) located in the chamber (24) can be clamped in between the clamping part (26) and the bottom surface of the chamber (24).

20. A removal device for separating and removing a gel piece (69) from a gel cutting (27) when carrying out a method in accordance with claim 15, wherein the device comprises:

(a) a substantially tubular removal means (66) disposed in a longitudinal displaceable manner on a carrier (53) and has one of its ends (83), that serves to make the separation, formed as a picking means, and

(b) a spring (68) that bears against the carrier (53) and the removal means (66) so that the removal means (66) can move out of its inoperative position against the return force of the spring (68).

21. The removal device according to claim 20, wherein when the removal means (66) is in the inoperative position, its end (83), which forms the picking means, protrudes furthest from the carrier (53).

22. A device for analyzing predetermined areas of a gel cutting, which comprises in particular of concentration points after a mixture separation has been carried out in the gel, said device comprises:

(a) a first device in which a gel holder (21) for receiving a gel cutting (27) can be inserted and which has means for detecting areas of the gel cutting (27) to be analyzed or for producing a representation of the gel cutting (27) in which areas involved in the analysis can be recognized, and

(b) a second device comprising a receiving point for the gel holder (21) and transport means for positioning a removal device (51), which serves for separating and removing a gel piece (69) from a gel cutting (27), over the selected areas of the gel cutting (27) in the gel holder (21) which are to be analyzed, and to move it towards the gel cutting (27) so that removal means (66) can be driven through the gel cutting (27) at a respective predetermined location for picking up a gel piece (69).

23. The device of claim 22 wherein the first device contains means for marking the areas to be analyzed on an electronically produced image of the gel cutting (27), said gel cutting (27) being in contact with an equilibrating liquid (31) in said gel holder (21),

24. The device according to claim 22, wherein the removal means (66) is connected to a device for producing underpressure and overpressure in the removal means (66) so that by means of underpressure in the removal means, (66) a gel piece (69) separated by the removal means (66) can be drawn into the removal means and a quantity of the liquid (31), surrounding the gel pieces, can be drawn in after the gel piece, and by production of overpressure in the removal means (66) the material received by the removal means, in particular the gel piece (69), can be ejected out of the removal means (66).

25. The device according to claim 22, wherein the gel holder (21) has a lower part (29) and an upper part (25), wherein the lower part has a chamber (24) which has a bottom surface and is formed to receive a plate-like gel cutting, and the upper part (25) has a clamping part (26) which, when the upper part (25) is placed on the lower part (29), protrudes into the chamber so that a peripheral portion of a gel cutting (27) located in the chamber (24) can be clamped in between the clamping part (26) and the bottom surface of the chamber (24).

26. The device according to claim 22, wherein the removal device (51) comprises:

- (a) a substantially tubular removal means (66) which is disposed in a longitudinally moveable manner on a carrier (53) and of which one end (83), serving to make the separation, is formed as a picking means, and
- (b) a spring (68), which bears against the carrier (53) and the removal means (66), so that the removal means (66) can be moved out of its inoperative position against the return force of the spring (68).